ASSEMBLING THE LARKEN 256K RAMDISK

Note- Assembling the ramdisk should only be done by an experienced kit assembler with very good soldering skills and good eyes! This is because the printed circuit board has very fine traces and the pads are smaller than normal. Also the board cannot survive de-soldering, so double check the placement before soldering.

- When soldering, do not use excessive heat, or pad damage may result. Also watch for solder bridges since some traces are very close together.

Parts Needed- As well as the list of parts on the following sheet, you should have a low-power fine-point soldering pencil, rosin core solder, small side cutters and fine covered wire for jumpers.

Assembling the PCB

Components are mounted on non solder side (component side) and soldered on solder side. When soldering use a small amount of solder to prevent solder bridges since some pads are very close.

Sockets should be used for all the integrated circuits. Install the sockets on the PCB first, so there will be fewer holes showing when you come to install the small components. Check sockets for bent pins. On the socket for the 74LS175, you must cut off pins 3 and 6 before installing the socket. Be sure the notched end of each socket faces the top of the PCB. Solder the sockets in place.

Next install the resistors and diodes according to the parts placement diagram. Some of the resistors may be too long to be mounted flat on the board, so let one end be raised. Be sure to install the diodes in the correct direction.

Next install the 3 capacitors. Notice that C-3 is mounted over the hole for the J-13 jumper, so dont mount this capacitor too tight to the board so it may be moved a bit when installing the J-13 jumper.

- Make sure that the 2 Electrolytic capacitors are installed with the correct polarity. (wrongly connected electrolytic capacitors may explode!).

You can now install the switch and resistor pack according to the diagrams. The end of the resistor pack with the 'dot' on it should point to the top of the board.

Install the 13 jumpers. Wire wrap wire works good for this.

On the solder side of the board you must add 1 diode. This is because the PCB company forgot to drill the 2 holes for this diode. The diode is mounted on the solder side just behind the bottom of the 74LS38 (see diode placement illustration). Cut one lead off the diode at a time and use the uncut end to hold the diode while soldering the other end. You will need to cut the diode very short (leave a lead aprox 1/8" long). Be sure to install the diode in the right direction.

Next step is to install the buss connector. The connector is installed into the solder side of the board. Notice that there is a space in the pcb connector holes. If the connector doesn't have the corresponding pins cut off (6 pins from one end), then cut off these pins 1/8" from the connector and bend the remaining 1/8" over to keep key from being pulled out. To install the connector, start at one end and work it in 2 pins at a time. Leave the connector 3/8" from the pcb and make sure it is straight before soldering it in place.

Soldering the connector in place is the most delicate part of the assembly.

The connector Locating Key can can be installed either by pressing the connector contact fingers (the same ones that have the leads cut off) together and then soldering them together, or the fingers can be removed and a small 1/4" X 3/8" piece of pcb glued into it.

The top row of connector pins that go through the pcb and connect to the small buss extender board, should be bent down to touch the extender board. The extender board should be pushed up against the main pcb to add strength to the connector assembly. Be sure to match the slot in the extender board to the key in the connector.

The battery holder can be glued on with 'Krazy Glue' or Contact Cement. Connect the '+' on the battery holder to the hole in the pcb (that connects to the diode above it), and connect the '-' with a wire to the ground buss that runs along the bottom of the ram chips on the solder side of the board.

TESTING the RAMDISK

- Clean the board thoroughly with solder flux remover or acetone and closely examine the entire board for solder bridges and very small shorts caused by imperfections in the pcboard printing. My experience in assembling this board has been that 75% have a bridge somewhere. Holding it up to a bright light and looking through the board makes it easier to find a fault. Use the tip of an Xacto knife to remove a short between two traces.

- Do not install any IC's yet. Install the board on the 2068 and see if the 2068 powers up properly. If the 2068 doesnt power up normally (screen freezes or crashes occur) then there is a solder bridge or a short on the board somewhere!

- If the 2068 powers up ok then remove the board from the 2068 and now you can install the 4 small IC's in their sockets according to the placement diagram.

Install 1 ramchip (only 1) in the 'Ram1' socket. Do not install any batteries.

Make sure that all the IC's have their Pin1 end at the top of the board (notched end to top).

Install the board back on the 2068 and turn the 2068 on. It should power up normally. If not then recheck for solder bridges bent IC pins wrong assembly etc.

If it powers up ok then turn it off and install the LKdos cartridge (with a version 3 eprom installed in the cartridge). Turn on the 2068 and enter the command RAND USR 100: GOTO 4. Make sure the write protect switch on the ramdisk is in the up position (non write protected).

Enter the command - RAND USR 100 : FORMAT "1",

The format should take a second or so, and the 2068 should return with a OK message.

If the WRITE PROTECT ERROR results, then the ramdisk is not working for any number of reasons. Check for solder bridges everywhere on the board under a bright light, bent IC pins, errors in assembly etc.

If the ramdisk formatted ok, then type RAND USR 100: CAT "", . You should get a good catalog. The RAND USR 100: VERIFY "" command can also be used to check operation.

With the ramdisk formatted, turn off the 2068 for 2 seconds and then turn it back on. Enter RAND USR 100: GOTO 4 (or you can hold down 'J' while powering up) to reselect the ramdisk. Enter RAND USR 100: VERIFY . The ramdisk should verify good. (The 22 uF capacitor can power the ramdisk for aprox 10 seconds without the batteries) If it doesnt verify good, there is probably something wrong.

If it is ok then remove it from the 2068 and install the rest of the ramchips (never install or remove chips if the batteries are installed.) Repeat the formatting of the ramdisk and verifying for the number of ram chips installed eg: RAND USR 100: FORMAT "N", (N = number of chips installed).

If if is ok then you can install the batteries and the ramdisk is ready to use.

TROUBLE SHOOTING

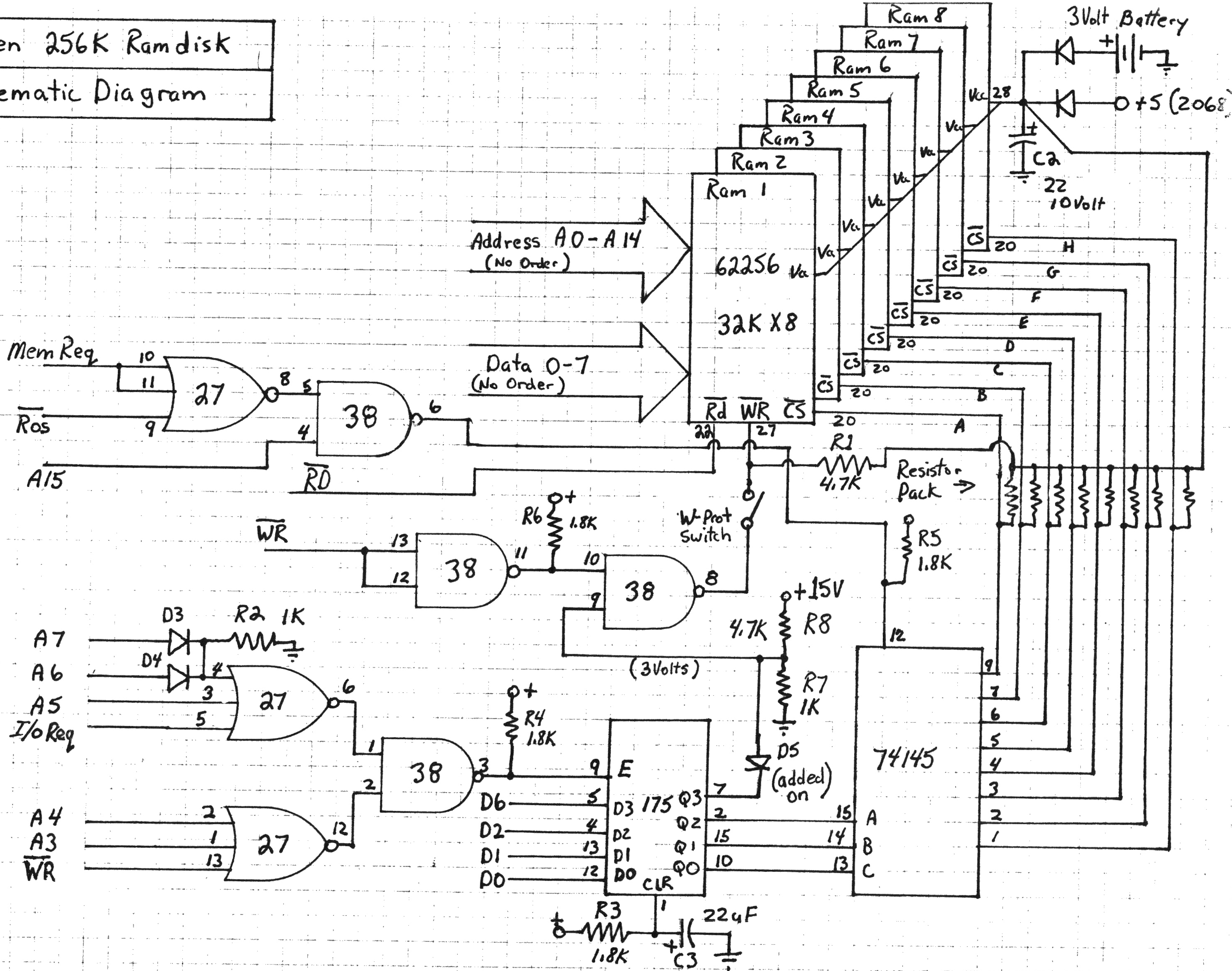
As mentioned previously the main reason for the ram disk not to work is a short or solder bridge on the pcb. I have had boards that i have had to look at for 10 minuites before finding the short so dont give up. You can also recheck the placement of parts, try replacing chips (though a bad chip is very rare), use an ohm meter to check for shorts between close pins or traces, check the switch for open and closed operation, check diodes in the circuit for proper voltage drop, recheck the values of resistors, check the connector for good contact on each pin etc.

If you are sure you cant get it working and the pcb hasnt been damaged, then return it to me and i will try to find the trouble. Include 1 ramchip and remove the batteries before wrapping the board in foil before shipping. The repair charge will be $15- 20. (including shipping).

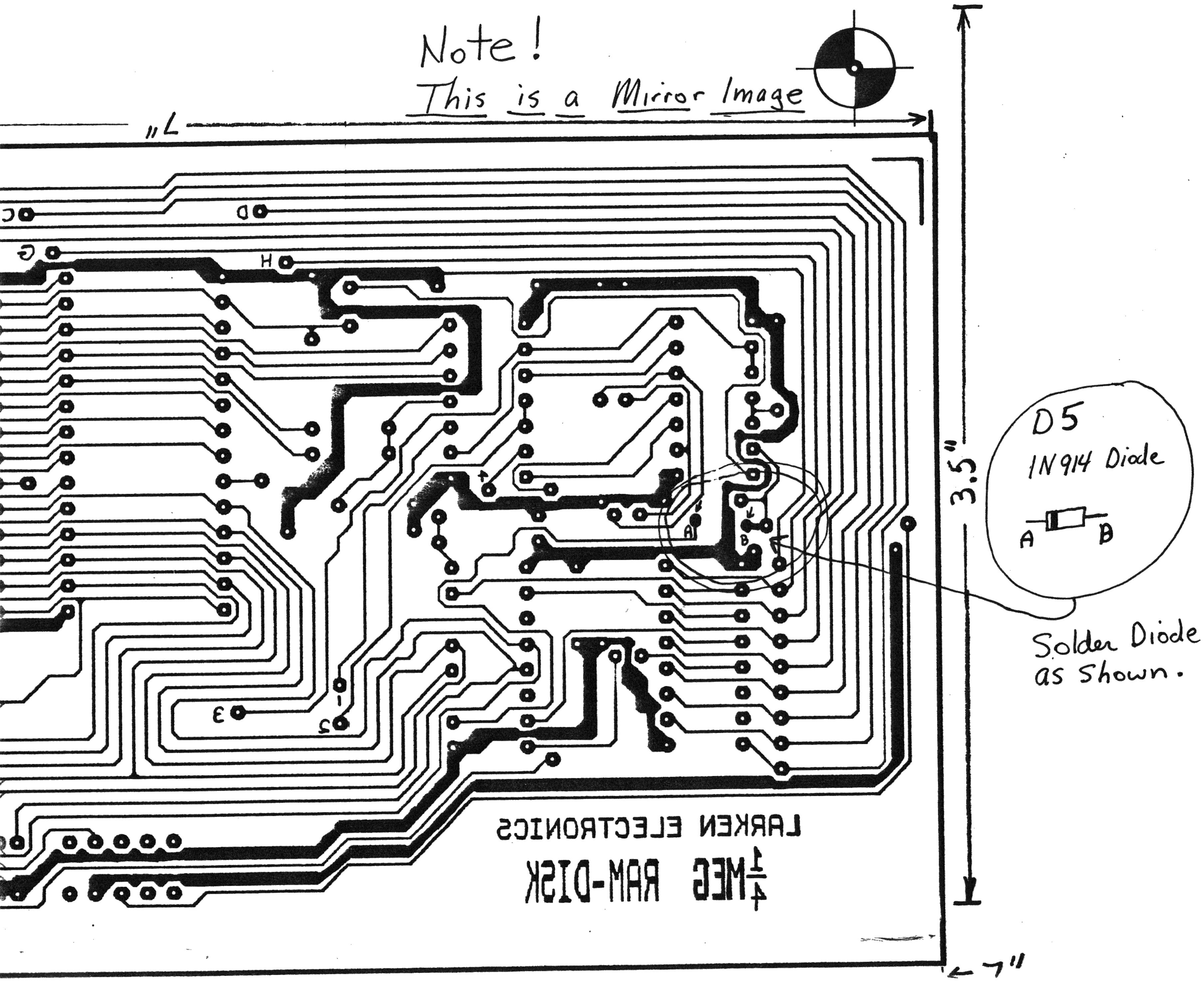
If the pcboard has been damaged i will probably not be able to fix it.

Larken 256K Ramdisk

Schematic Diagram



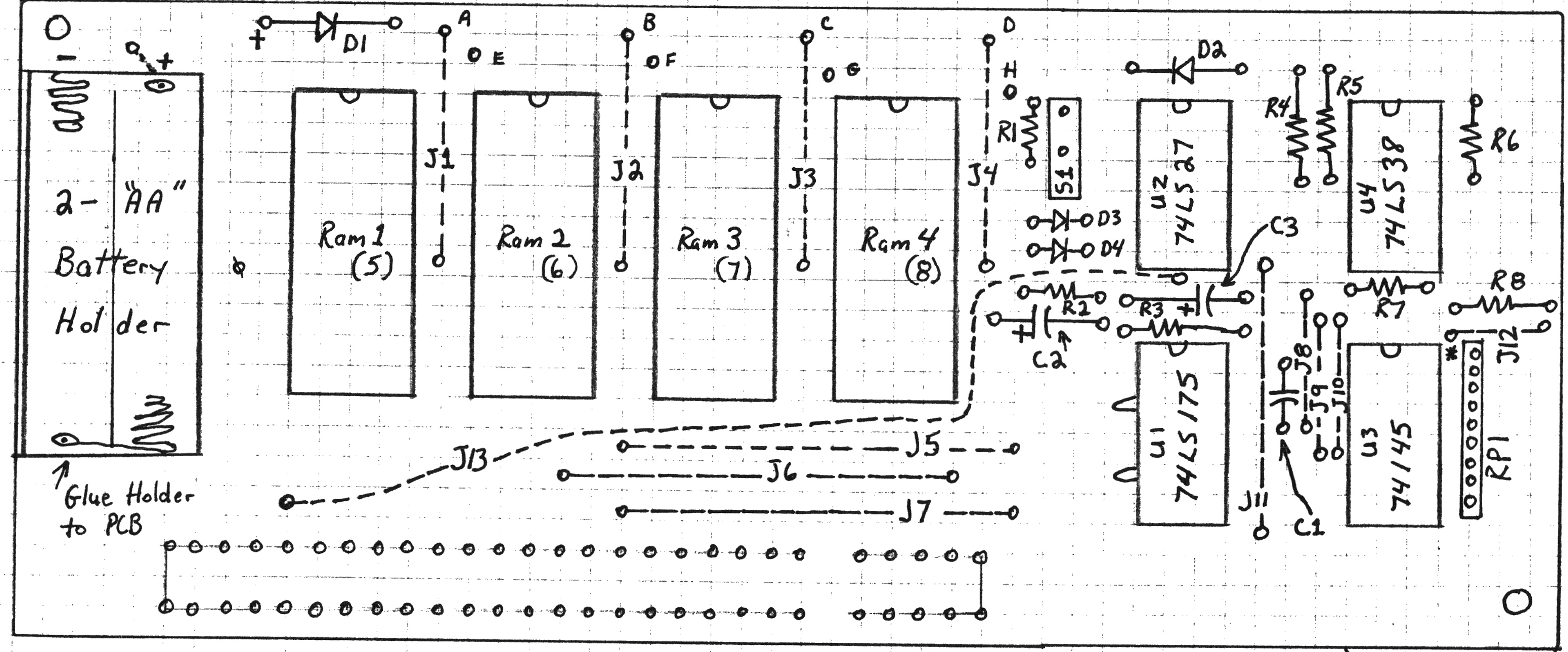
Note!
This is a Mirror Image



Solder Diode as Shown.

Larken 256K Ramdisk
Parts Placement Diagram

(Component Side)



R1 - 4.7K SU
R2 - 1K SU
R3 - 1.8K LD
R4 1.8K LD
R5 1.8K LD
R6 1.8K LD
R7 1K SU
R8 4.7K LD
(RP1 - 1K-4.7K Resistor Pack
*- end with dot)

All Resistors 1/4 watt 10%

SU = STAND UP LD = LAY DOWN

C1 .1 uF 50Volt
C2 22 uF 10 Volt
C3 22 uF 10 Volt

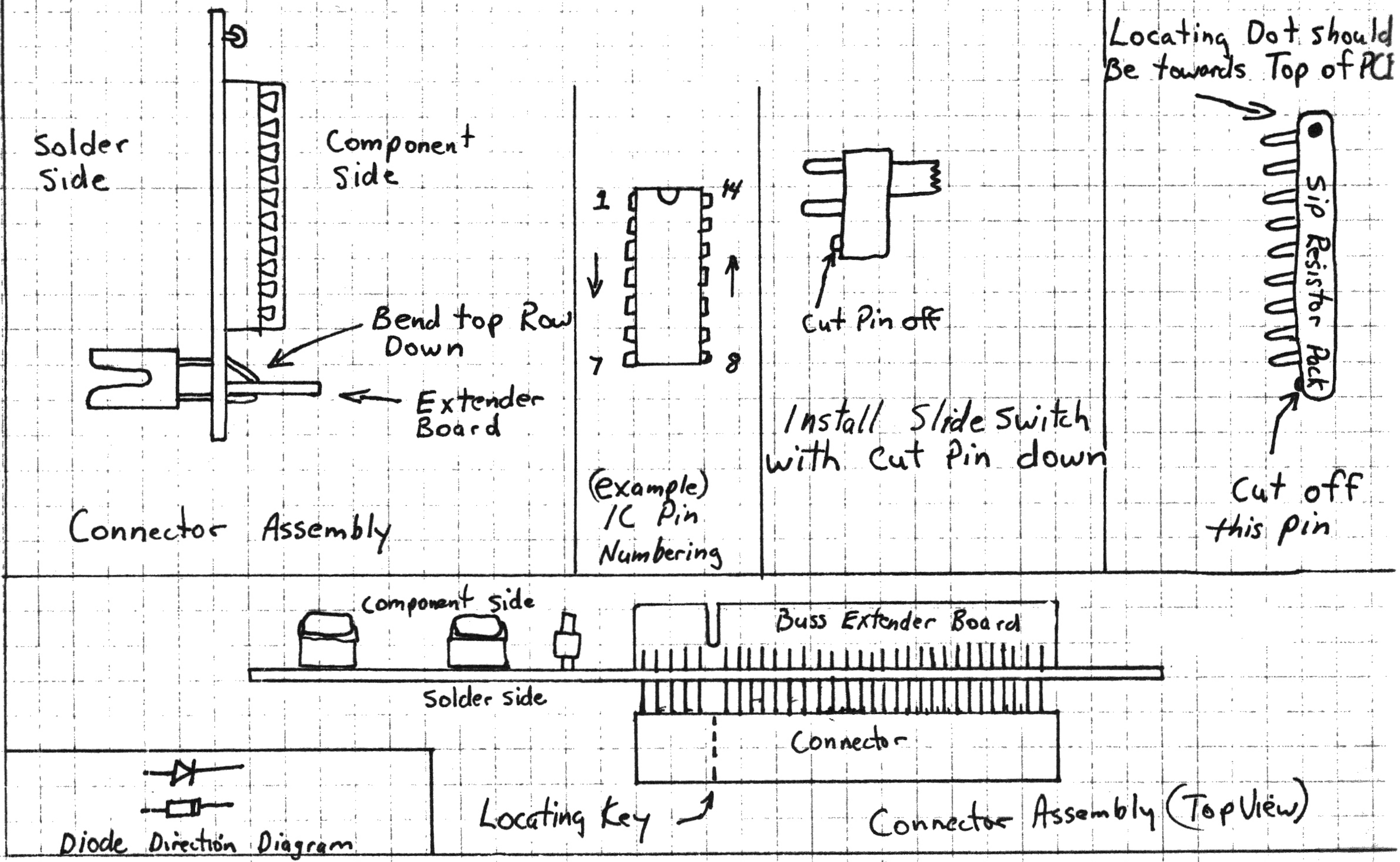
D1 - IN914 (or Shottkey)
D2, D3, D4 - IN914
D5 - IN914 (Solder side of PCB)
S1 - Miniature Slide Switch

(all IC's in sockets)
U1 74HCT175 or 74LS175 18K25
U2 74LS27 or 74HCT27 18K18
U3 74145 (only)
U4 74LS38 or 7438 18K65

Ram 1-8 - 32K X 8 Static Low power Ram. (62256-LP)

J1 - J13 - Wire Jumpers (fine Solid Wire, with Coating)

Ram Disk Assembly Diagrams



ABOUT the RAMDISK CIRCUIT

The ramdisk circuit is not very complicated but has a few unique features for reliable battery backup operation.

The ramchips are mapped into the upper 32K of the dock bank. Only one chip is selected at a time. I/O port 7 (0-7) is decoded as a bank control port and dat is latched into the '175' by an OUT (7) command.

The 74145 is a decoder with open collector outputs and it selects one of the 8 ramchips according to the data in the lower 3 bits of the '175' latch. The open collector outputs of the 74145 and the 74LS38 dont load the ramchips when the 2068 is turned off, which is nessessary for the non-volatile ramdisk. Pullu resistor R1 and the resistor pack are connected to the ramchips + supply to kep the Write-Enable and chip- enables high when the 2068 is turned off.

The data is protected from power up/down glitches by the voltage divider R7-R8 which disables the ram's Write-Enable if the +15 power supply is below 10 volts (rising or falling) . Bit 6 of the bank control port is used to control write protection of the ram also. The LKdos always keeps the ramdisk write protected between operations. Out 7,64 (+bank address) can select a ram chip unwrite protected.

Power on reset R3-C3, clears the '175' on power up which also leaves the ram write-protected on power up.

The order of ramchip selection is not linear because of a small PCB error. The connection of the 3 data lines between the '175' and the 74145 is in the wrong order. The LKdos operating system compensates for this by using a lookup table to convert logical to actual bank address. The ram bank order table is on the ramdisk documentation sheet.